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(54) Optical fibre splice

(57) In an improved method of effecting end-to-end joints between optical fibres 4 of two optical fibre ribbons 3, the optical fibres of each ribbon are separated over an end part of the ribbon and are introduced into longitudinally extending, parallel grooves transversely spaced in a surface of one of two elongate support members 1, the transverse spacing and cross-sectional shapes of the grooves in one member being identical to those of the other member. A coating 5 of hardenable material is applied over the surface of each member and over the optical fibres 4 supported in the grooves to bond the fibres in the grooves. Each elongate member 1 is cut and polished so that end faces of the optical fibres 4 and an end face of the elongate member lie in the common plane which is normal to the axes of the fibres. The members 1 are then maintained in alignment by a clip 7 with the end face of one member abutting that of the other and with the abutting optical fibres 4 supported on the two elongate members in axial alignment.

Fig.3.

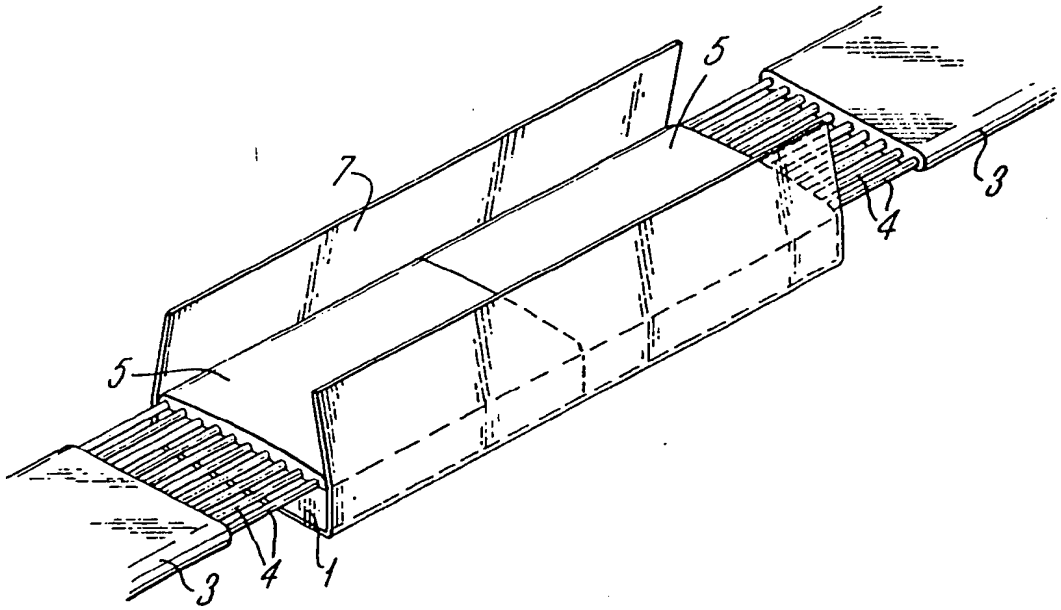

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Fig. 1.

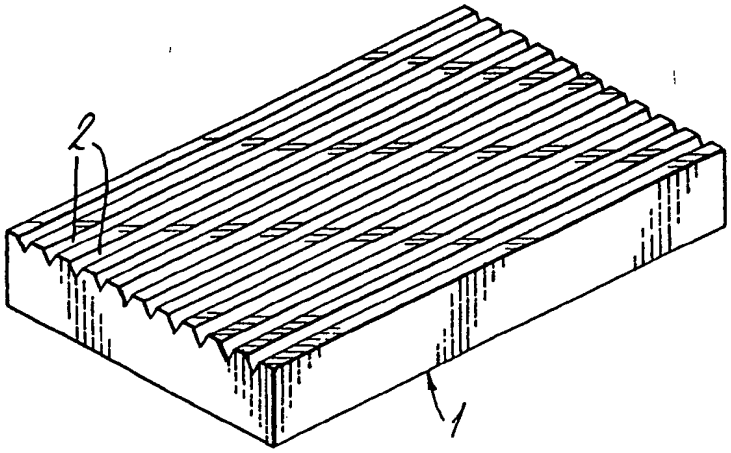


Fig. 2.

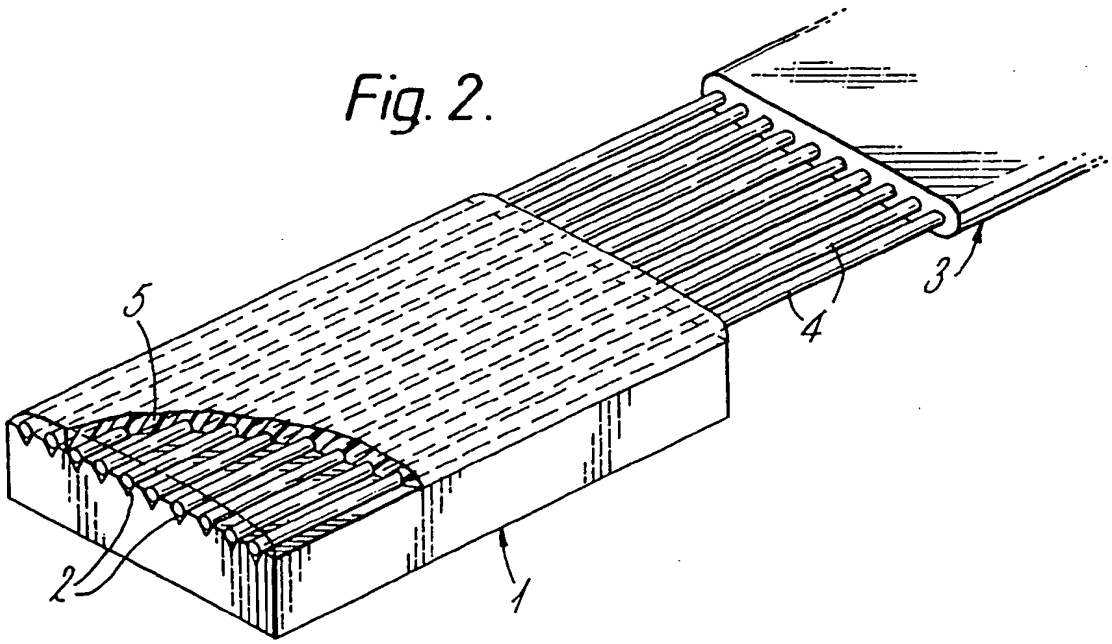
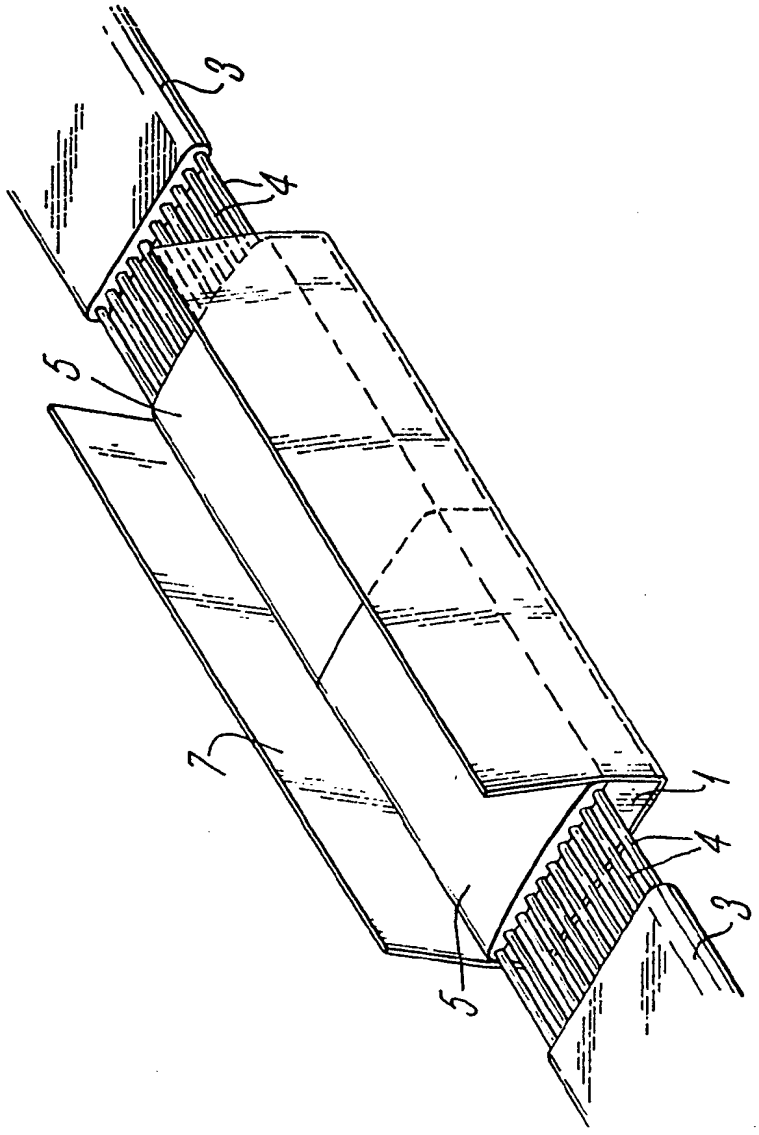


Fig.3.



SPECIFICATION

Optical fibre splice

This invention relates to optical fibre ribbon of the kind comprising a plurality of optical fibres arranged side by side with their axes lying in a substantially common plane and embedded in an elongate body of plastics material. Optical fibre ribbons of this kind will, for convenience, hereinafter be referred to as "of the kind described".

It is an object of the present invention to provide an improved method of effecting end-to-end joints between optical fibres of two lengths of optical fibre ribbon of the kind described, which method can be readily effected both in the field or in the laboratory by both semi-skilled and unskilled personnel.

According to the invention, the improved method comprises separating the optical fibres of each length of optical fibre ribbon over an end part of the length; introducing the separated optical fibres of each ribbon into longitudinally extending, substantially parallel grooves transversely spaced in a surface of one of two elongate support members, the transverse spacing and cross-sectional shapes of the grooves in one member being substantially identical to those of the other member; applying a coating of hardenable material over said surface of each elongate member and over the optical fibres supported in the grooves therein to bond the optical fibres in the grooves; so treating each elongate support member with the optical fibres bonded in the grooves therein that end faces of the optical fibres and an end face of the elongate member lie in a substantially common plane which is substantially normal to the axes of the optical fibres; and maintaining the elongate members in substantial alignment with said end face of one elongate member abutting said end face of the other elongate member and with the abutting optical fibres supported on the two elongate members in substantially axial alignment.

Optical fibres of a length of optical fibre ribbon of the kind described may be initially so introduced into the grooves of an elongate support member that end faces of the optical fibres are approximately co-planar with an end face of the member and, after the coating of hardenable material has been applied and has set, these end faces of the member and of the optical fibres may be polished so that the end faces lie in a substantially common plane which is substantially normal to the axes of the optical fibres. Alternatively, after the optical fibres have been introduced into the grooves of an longate support member and the subsequently applied coating of hardenable material has set, the elongate support member with the optical fibres bonded in the grooves therein is transversely cut to form an end in which end faces of the member and of the optical fibres lie in an approximately common plane and these end faces may then be polished so that they lie in a substantially common plane which is substantially normal to the axes of the fibres.

In a modification of this step of the improved method hereinbefore described, separated optical fibres of each optical fibre ribbon are introduced into opposite end parts of longitudinally extending substantially parallel grooves transversely spaced in a surface of a single elongate support member in such a way that the optical fibres substantially abut and, after a subsequently applied coating of hardenable material has set to bond the optical fibres in the grooves, the support member is transversely cut in the vicinity of the abutting end faces of the optical fibres and the ends of the member and of the optical fibres formed by the cut may each be polished so that end faces of the member and of the optical fibres of each part of the cut member lie in a common plane which is substantially normal to the axes of the fibres.

Preferably, the two elongate support members are maintained in substantial alignment with their end faces abutting by introducing the elongate support members into opposite ends of an elongate resilient clip of substantially channel-shaped transverse cross-section until the end faces abut.

Preferably, any plastics coating on that part of each optical fibre to be introduced into a groove in the surface of an elongate support member is removed before the optical fibre is introduced into the groove. Preferably, also, each groove in the or each elongate support member has a transverse cross-section of V- or approximately semi-circular-shape.

The or each elongate support member is preferably of a non-metallic material, a hardened transparent plastics material being preferred. In a preferred embodiment, each elongate support member has a transverse cross-section of rectangular shape with the longitudinally extending, transversely spaced grooves extending along the length of one of the major faces of the member.

The invention also includes end-to-end joints between optical fibres of two lengths of optical fibre ribbon of the kind described effected by the improved method hereinbefore described.

Two or more end-to-end joints between the optical fibres of two lengths of optical fibre ribbon of the kind described may be housed in a cassette or other container, the aligned elongate support members of each joint between two lengths of optical fibre ribbon being so positioned in the cassette or other container that there is ample space for an excess length of each optical fibre ribbon to be looped in the container. For example, where abutting elongate support members are

maintained in alignment in an elongate resilient clip of substantially channel-shaped cross-section, such elongate resilient clips can be secured side by side to a wall of the cassette or other container.

The invention will be further illustrated by a description, by way of example, of the preferred method of effecting end-to-end joints between optical fibres of two lengths of optical fibre ribbon of the kind described with reference to the accompanying drawings, in which:

Figure 1 is an isometric view of an elongate support member to be used in the method of the invention;

Figure 2 is an isometric view of optical fibres of an optical fibre ribbon secured in the grooves of the elongate support member shown in Figure 1, and

Figure 3 is an isometric view, partly in section, of the end-to-end joint between optical fibres of two lengths of optical fibre ribbon made by the preferred method.

Referring to the drawings, one of the two elongate support members to be used in the method is shown in Figure 1 and comprises a block 1 of hardened transparent plastics material which has a transverse cross-section of rectangular shape and which has, extending along the length of one of the major faces of the member, ten longitudinally extending, parallel, transversely spaced grooves 2, each of V-shaped cross-section.

As will be seen on referring to Figure 2, optical fibres 4 of one of the two lengths of optical fibre ribbon 3 which are to be jointed end-to-end are separated over an end part of the length and the separated optical fibres are introduced into the longitudinally extending grooves 2 in a major surface of the elongate support member 1. A coating 5 of hardenable plastics material is then applied over the surface of the elongate member 1 and over the optical fibres 4 supported in the grooves 2 therein to bond the optical fibres in the grooves. After the optical fibres 4 have been introduced into the grooves 2 of the elongate support member 1 and the subsequently applied coating 5 of hardenable plastics material has set, the elongate support member 1 with the optical fibres 4 bonded in the grooves 2 therein is transversely cut to form an end in which end faces of the member and of the optical fibres lie in an approximately common plane and these end faces are then polished so that they lie in a substantially common plane which is substantially normal to the axes of the fibres.

The operation as described with r ference to Figure 2 is repeated for the optical fibres of the second optical fibre ribbon.

The two elongate support members 1 with the optical fibres 4 bonded in the grooves 2 are then introduced into opposite ends of an elongate resilient clip 7 of substantially channel-shaped transverse cross-section, as shown in Figure 3, until the polished end faces of the elongate support members abut, in which position the optical fibres supported on one elongate support member are maintained by the clip in axial alignment with the optical fibres supported on the other elongate support member.

CLAIMS

1. A method of effecting end-to-end joints between optical fibres of two lengths of optical fibre ribbon of the kind described, which method comprises separating the optical fibres of each length of optical fibre ribbon over an end part of the length; introducing the separated optical fibres of each ribbon into longitudinally extending, substantially parallel grooves transversely spaced in a surface of one of two elongate support members, the transverse spacing and cross-sectional shapes of the grooves in one member being substantially identical to those of the other member; applying a coating of hardenable material over said surface of each elongate member and over the optical fibres supported in the grooves therein to bond the optical fibres in the grooves; so treating each elongate support member with the optical fibres bonded in the grooves therein that end faces of the optical fibres and an end face of the elongate member lie in a substantially common plane which is substantially normal to the axes of the optical fibres; and maintaining the elongate members in substantial alignment with said end face of one elongate member abutting said end face of the other elongate member and with the abutting optical fibres supported on the two elongate members in substantially axial alignment.

2. A method as claimed in Claim 1, wherein the optical fibres are initially so introduced into the grooves of the elongate support member that end faces of the optical fibres are approximately co-planar with an end face of the member and, after the coating of hardenable material has been applied and has set, these end faces of the member and of the optical fibres are polished so that the end faces lie in a substantially common plane which is substantially normal to the axes of the optical fibres.

3. A method as claimed in Claim 1, wherein, after the optical fibres have been introduced into the grooves of the elongate support member and the subsequently applied coating of hardenable material has set, the elongate support member with the optical fibres bonded in the grooves therein is transversely cut to form an end in which end faces of the member and of the optical fibres lie in an approximately common plane and these end faces are then polished so that they lie in a substantially common plane which is substantially normal to the axes of the fibres.

4. A modification of the method claimed in any one of the preceding Claims, wherein separated optical fibres of each optical fibre ribbon are introduced into opposite end parts of longitudinally extending substantially parallel grooves transversely spaced in a surface of a single elongate support member in such a way that the optical fibres substantially abut and, after a subsequently applied coating of hardenable material has set to bond the optical fibres in the grooves, the support member is transversely cut in the vicinity of the abutting end faces of the optical fibres and the ends of the member and of the optical fibres formed by the cut are each polished so that end faces of the member and of the optical fibres of each part of the cut member lie in a common plane which is substantially normal to the axes of the fibres.

5. A method as claimed in any one of the preceding Claims, wherein the two elongate support members are maintained in substantial alignment with their end faces abutting by introducing the elongate support members into opposite ends of an elongate resilient clip of substantially channel shaped transverse cross-section until the end faces abut.

6. A method as claimed in any one of the preceding Claims, wherein any plastics coating on that part of each optical fibre to be introduced into a groove in the surface of an elongate support member is removed before the optical fibre is introduced into the groove.

7. A method as claimed in any one of the preceding Claims, wherein each groove in the or each elongate support member has a transverse cross-section of V- or approximately semi-circular-shape.

8. A method as claimed in any one of the preceding Claims, wherein the or each elongate support member is of a hardened transparent plastics material.

9. A method as claimed in any one of the preceding Claims, wherein the or each elongate support member has a transverse cross-section of rectangular shape with longitudinally extending, substantially parallel transversely spaced grooves extending along the length of one of the major faces of the member.

10. A method of effecting end-to-end joints between optical fibres of two lengths of optical fibre ribbon substantially as hereinbefore described with reference to the accompanying drawings.

11. End-to-end joints between optical fibres of two lengths of optical fibre ribbon of the kind described effected by the method claimed in any one of the preceding Claims.

12. Two or more end-to-end joints between optical fibres of two lengths of optical fibre ribbon of the kind described effect d by th m thod claimed in any one of Claims 1 to 10, wherein the nd-to-end joints are housed in a cassette or other container, the aligned elongat support members of each joint being so positioned in the cassette or other container that there is ample space for an excess length of each optical fibre ribbon to be looped in the container.

13. End-to-end joints between optical fibres of two lengths of optical fibre ribbon as claimed in Claim 12, wherein abutting elongate support members of each joint are maintained in alignment in an elongate resilient clip of substantially channel-shaped cross-section, the elongate resilient clips of the joints being secured side-by-side to a wall of the cassette or other container.

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